2.8 Graphing from Factored Form

Now that you know the zeros of f(x) = (x + 4)(x - 2) are - 4 and 2 you can determine the axis of symmetry and vertex of the parabola:

f(x) = a(x - r)(x - s)

- The axis of symmetry occurs half way between the zeros

  x = r + s / 2

- Since the axis of symmetry gives you the x of the vertex determine vertex of the parabola by subing in and solving for the y

$x = \frac{-4+2}{2}$

$x = -1$

Vertex $(-1, -9)$

Step: 1, 3, 5

Vertex (x, y) $(-1, \_)$

$y = (-1+4)(-1-2)$

$= (3)(-3)$

$= -9$

Now determine y intercept of a parabola

- let x = 0

  f(x) = (x + 4)(x - 2)

$= (0+4)(0-2)$

$= -8$

All the points we have:

$(0, -8)$ y-intercept

$(-4, 0)$ & $(2, 0)$ zeroes

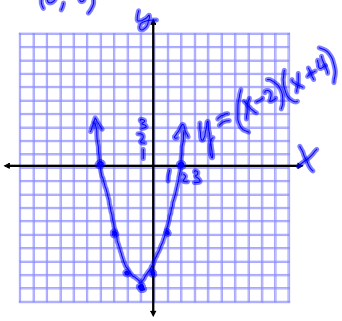
$(-1, -9)$ Vertex

Now sketch the parabola with all the above info:

zeros: $(2,0)$ & $(-4,0)$

vertex: $(-1,-9)$

yint: $(0,-8)$



Ex 2 Graph $f(x) = 2x^2 - 4x - 6$ $\Rightarrow -8$

Hint

1. Factor and find the zeros
2. Find the vertex (halfway beteween the zeros)
3. Find the y intercept (use the standard form)
4. Find another point using symmetry

Factor:

f(x) = 2x² - 4x - 6

$= 2(x^2 - 2x - 3)$ M: -3, A: -2, N: 1, 3

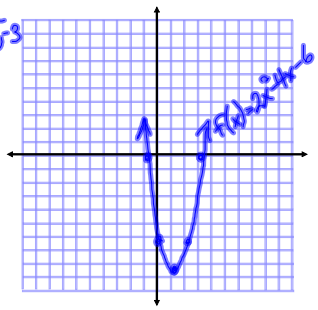
$= 2(x+1)(x-3)$

Zeroes: -1 and 3

$AOS = \frac{-1+3}{2}$

$= 1$

Vertex $(1, -8)$



Try this one: Determine the y intercept and the coordinates of the vertex

$f(x) = 2x^2 - 5x - 12$ ← y-intercept

M A N
-24 -5 -8, 3

$= 2x^2 - 8x + 3x - 12$
$= 2x(x-4) + 3(x-4)$
$= (x-4)(2x+3)$

$x = 4$ or $2x+3=0$, $2x = -3$, $x = -\frac{3}{2}$

$AOS = \frac{4 + -\frac{3}{2}}{2}$
$= \frac{\frac{8}{2} - \frac{3}{2}}{2}$
$= \frac{\frac{5}{2}}{2}$
$= \frac{5}{2} \div 2$
$= \frac{5}{2} \times \frac{1}{2}$
$= \frac{5}{4}$

Vertex $(\frac{5}{4}, \_)$

sub $x = \frac{5}{4}$ into $2(x-3)(x+1)$
$= (x-4)(2x+3)$
$= (1.25-4)(2(1.25)+3)$
$= -15.125$

Vertex $(\frac{5}{4}, -15.125)$

Sooooo.....

What can you tell from factored form?

$f(x) = a(x - r)(x - s)$

➡ direction of opening and stretch* — the zeros

*be careful of the stretch:
$f(x) = 2(x+1)(x-5)$ stretch factor 2

$f(x) = 2(3x+1)(4x-5)$ stretch factor $2(3)(4) = 24$

What can you tell from standard form?

$f(x) = ax^2 + bx + c$

direction of opening and stretch — y-intercept ⬅

Ex 4
Determine an equation, in standard form, of the curve:

Step 1
From the graph we know the zeros they are:

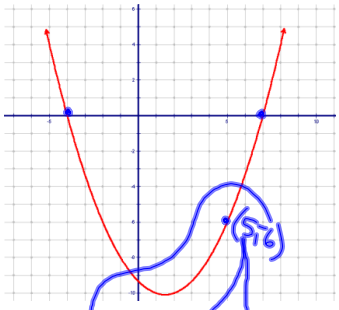
➡ -4 and 7

Step 2
Find a point on the graph

➡ (5, -6)

Step 3
Use general factored form $y=a(x-s)(x-t)$

sub in the zeros (s and t) and the point (x,y) to find the coefficient **a:**



Step 4
State equation

$y = a(x+4)(x-7)$

$f(x) = a(x - r)(x - s)$ sub in y intercept, zeros and another point to solve a.

$-6 = a(x - (-4))(x - (+7))$

$-6 = a(x+4)(x-7)$
$-6 = a(5+4)(5-7)$
$-6 = a(9)(-2)$
$-6 = a(-18)$
$\frac{-6}{-18} = \frac{a(-18)}{-18}$
$a = \frac{3}{9}$
$a = \frac{1}{3}$

$y = \frac{1}{3}(x+4)(x-7)$

Assigned Work:
p 139 # 1, 2cd, 3d, 4 abd, 5 adf, 7bcde, 8, 12
Also Review Unit 1-Vertex form (next class we will be changing from standard form to vertex form)